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| 10/720,308 | 11/25/2003 | Yasunori Kaneda | H-1121 | 4719 |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|  | Application No. | Applicant(s) |
|---|---|---|
| **Office Action Summary** | 10/720,308 | KANEDA ET AL. |
|  | Examiner | Art Unit |  |
|  | Arpan P. Savla | 2185 |  |

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on _27 April 2007_.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) _14-32_ is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) _14-32_ is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All b)☐ Some * c)☐ None of:
        1.☐ Certified copies of the priority documents have been received.
        2.☐ Certified copies of the priority documents have been received in Application No. _____.
        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

A request for continued examination under 37 CFR 1.114, including the fee set

forth in 37 CFR 1.17(e), was filed in this application after final rejection.  Since this

application is eligible for continued examination under 37 CFR 1.114, and the fee set

forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action

has been withdrawn pursuant to 37 CFR 1.114.  Applicant's submission filed on April

27, 2007 has been entered.


### *Response to Amendment*

This Office action is in response to Applicant's communication filed April 27, 2007

in response to the Office action dated December 27, 2006.  Claims 14-32 have been

amended.  Claims 14-32 are pending in this application.


## OBJECTIONS

### *Claims*

1.      In view of Applicant's amendment, the objections to **claims 15-22 and 24-32**

have been withdrawn.


### *Claim Rejections - 35 USC § 103*

2.      The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set
forth in section 102 of this title, if the differences between the subject matter sought to be patented and
the prior art are such that the subject matter as a whole would have been obvious at the time the
invention was made to a person having ordinary skill in the art to which said subject matter pertains.
Patentability shall not be negatived by the manner in which the invention was made.

3.      **Claims 14-17, 23-26, and 32 are rejected under 35 U.S.C. 103(a) as being**

**obvious over Allen et al. (U.S. Patent 5,546,557) in view of Blood et al. (U.S. Patent**

**Application Publication 2003/0110351).**

4.      **As per claim 14**, Allen discloses a data storage apparatus coupled to a

computer, comprising:

a control unit for processing a command transmitted from the computer, the

control unit being coupled to the computer (col. 14, lines 45-47; Fig. 6, elements 45 and

52); *It should be noted that the one of host processors 45 is analogous to the*

*"computer."*

a memory for storing data necessary for the processing of the command by the

control unit, the memory coupled to the control unit (col. 15, lines 2-4);

a plurality of non-removable storage devices coupled to the control unit (col. 10,

lines 49-52; col. 14, lines 52-55; col. 22, lines 13-16; Fig. 6, element 54); *It should be*

*noted that the "PVPs" are analogous to the "a plurality of non-removable storage*

*devices."*

a first storage volume and a second storage volume configured on the non-

removable storage devices (col. 9, lines 63-65; col. 11, lines 25-40; Fig. 4), *It should be*

*noted that the first and second "LV's" are analogous to the "first storage volume" and*

*the "second storage volume."*

wherein the control unit virtualizes at least one of the non-removable storage

devices as a virtualized removable storage drive for the computer (col. 14, lines 50-52;

col. 27, lines 20-30; Fig. 5, element 53; Fig. 18), *It should be noted that the LV's act as*

*"virtualized removable storage drives."*

a volume management table stored in memory (col. 14, lines 35-43; Fig. 6,

element 50). *It should be noted that the "system volume catalog" is analogous to the*

*"volume management table."*

Allen does not expressly disclose the first storage volume is mapped to the

virtualized removable storage drive and the second volume is not mapped to the

virtualized removable storage drive in a volume management table stored in memory,

and wherein, in response to a verification command issued by the computer, the

control unit replies with identification information of the virtualized removable storage

drive so that the computer recognizes the first storage volume as a volume, separate

from the second storage volume, that the computer should recognize when the

computer is booted.

Blood discloses the first storage volume is mapped to the virtualized removable

storage drive and the second volume is not mapped to the virtualized removable

storage drive (paragraph 0026; Fig. 3, elements 71 and 73); *It should be noted that the*

*emulated "floppy disk drive" is analogous to the "virtualized removable storage drive."*

and wherein, in response to a verification command issued by the computer, the

control unit replies with identification information of the virtualized removable storage

drive so that the computer recognizes the first storage volume as a volume, separate

from the second storage volume, that the computer should recognize when the

computer is booted (paragraph 0027; Fig. 4, elements 210, 212, and 214). *It should be*

*noted that the "ATA controller" is analogous to the "computer" and the "virtual disk*

*subsystem" is analogous to the "control unit."*

Allen and Blood are analogous art because they are from the same field of

endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary

skill in the art to implement Blood's virtual disk subsystem within Allen's data storage

system.

The motivation for doing so would have been to enable a data processing system

to execute software that normally would require a local disk drive. The need for local

disk drives is therefore eliminated. In addition, remote administration of the data

processing system is facilitated, in that the data processing system can be configured to

retrieve software such as an operating system and/or an application for testing the data

processing system from a remote data source. For instance, the virtual disk subsystem

permits the data processing system to boot from a virtual floppy disk (Blood, paragraph

0039).

Therefore, it would have been obvious to combine Allen and Blood for the benefit

of obtaining the invention as specified in claim 14.

5.      **As per claim 15**, the combination of Allen/Blood discloses based on receiving a

second instruction for ejecting the virtualized removable storage drive from the

computer, the control unit modifies the volume management table, so that the control

unit makes the computer recognize that the first storage volume is ejected (Allen, col.

23, lines 26-47; col. 24, lines 13-14); *It should be noted that the "migrate command" is*

*analogous to the "second instruction."*

and the control unit notifies the computer of completion of ejecting the first

storage volume (Allen, col. 24, lines 13-14).

6.      **As per claim 16**, the combination of Allen/Blood discloses the first instruction is

sent from a management computer which is coupled to the data storage apparatus

(Allen, col. 20, lines 32-33; Fig. 6, element 45); *It should be noted that another one of*

*host processors 45 is analogous to the "management computer."*

and wherein, wherein the control unit notifies the management computer of

mapping the first storage volume to the virtualized removable storage drive (Allen, col.

26, lines 23-28).

7.      **As per claim 17**, the combination of Allen/Blood discloses wherein the first

instruction is sent from the computer (Allen, col. 20, lines 32-33; Fig. 6, element 45).

8.      **As per claim 23**, Allen discloses a data storage system comprising:

a computer (col. 14, lines 17-20; Fig. 6, element 45);

a data storage apparatus, coupled to the computer (Fig. 6, element 48), which

includes a plurality of storage volumes which are configured by non-removable storage

drives (col. 10, lines 49-52; col. 14, lines 52-55; col. 22, lines 13-16; Fig. 6, element 54)

and which virtualizes at least one of the non-removable storage devices as a virtualized

removable storage drive for the computer (col. 14, lines 50-52; col. 27, lines 20-30; Fig.

5, element 53; Fig. 18); *See the citation note for the similar limitation in claim 14 above.*

a volume management table stored in memory (col. 14, lines 35-43; Fig. 6, element 50). *See the citation note for the similar limitation in claim 14 above.*

wherein the computer sends a first instruction to the data storage apparatus to eject the virtualized removable storage drive (col. 22, line 38); *See the citation note for the similar limitation in claim 15 above.*

and in response to receiving the first instruction, the data storage apparatus notifies the computer of completion of ejecting the virtualized removable storage drive (col. 24, lines 13-14). *See the citation note for the similar limitation in claim 15 above.*

Allen does not expressly disclose the first storage volume is mapped to the virtualized removable storage drive and the second volume is not mapped to the virtualized removable storage drive in a volume management table stored in memory,

and wherein, in response to a verification command issued by the computer, the control unit replies with identification information of the virtualized removable storage drive so that the computer recognizes the first storage volume as a volume, separate from the second storage volume, that the computer should recognize when the computer is booted.

Blood discloses the first storage volume is mapped to the virtualized removable storage drive and the second volume is not mapped to the virtualized removable storage drive (paragraph 0026; Fig. 3, elements 71 and 73); *See the citation note for the similar limitation in claim 14 above.*

and wherein, in response to a verification command issued by the computer, the control unit replies with identification information of the virtualized removable storage

drive so that the computer recognizes the first storage volume as a volume, separate

from the second storage volume, that the computer should recognize when the

computer is booted (paragraph 0027; Fig. 4, elements 210, 212, and 214). *See the*

*citation note for the similar limitation in claim 14 above.*

Allen and Blood are analogous art because they are from the same field of

endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary

skill in the art to implement Blood's virtual disk subsystem within Allen's data storage

system.

The motivation for doing so would have been to enable a data processing system

to execute software that normally would require a local disk drive. The need for local

disk drives is therefore eliminated. In addition, remote administration of the data

processing system is facilitated, in that the data processing system can be configured to

retrieve software such as an operating system and/or an application for testing the data

processing system from a remote data source. For instance, the virtual disk subsystem

permits the data processing system to boot from a virtual floppy disk (Blood, paragraph

0039).

Therefore, it would have been obvious to combine Allen and Blood for the benefit

of obtaining the invention as specified in claim 23.

9.      **As per claim 24**, the combination of Allen/Blood discloses wherein the data

storage apparatus modifies the volume management table so that the data storage

apparatus makes the computer recognize that the first storage volume is ejected (Allen,

col. 23, lines 26-47). *See the citation notes for claim 15 above.*

10.    **As per claim 25**, the combination of Allen/Blood discloses a management

computer coupled to the data storage apparatus (Allen, Fig. 6, element 45), wherein the

management computer sends a second instruction to the data storage apparatus to

load the virtualized removable storage drive (Allen, col. 10, lines 1-9); *See the citation*

*notes for claims 14 and 16 above.*

in response to receiving the second instruction from the management computer,

the data storage apparatus modifies the volume management table to create the

relation between the virtualized removable storage drive and the first storage volume so

that the data storage apparatus makes the computer recognize that the first storage

volume is loaded to the virtualized removable storage drive (Allen, col. 20, lines 9-26;

Fig. 7). *See the citation notes for claim 14 above.*

11.    **As per claim 26**, the combination of Allen/Blood discloses wherein the computer

sends a second instruction to the data storage apparatus to load the virtualized

removable storage drive (Allen, col. 10, lines 1-9), *See the citation notes for claim 14*

*above.*

in response to receiving the second instruction from the computer, the data

storage apparatus modifies the volume management table to create the relation

between the virtualized removable storage drive and the first storage volume so that the

data storage apparatus makes the computer recognize that the first storage volume is

loaded to the virtualized removable storage drive (Allen, col. 20, lines 9-26; Fig. 7). *See the citation notes for claim 14 above.*

12.     **As per claim 32**, the combination of Allen/Blood discloses the computer recognizes that the data storage apparatus includes a non-removable storage medium (Allen, col. 16, lines 57-62).

13.     **Claims 20, 22, and 27-29 are rejected under 35 U.S.C. 103(a) as being obvious over Allen in view of Blood as applied to claim 14 above, and further in view of Ofek (U.S. Patent 6,101,497).**

14.     **As per claim 20**, the combination of Allen/Blood discloses all the limitations of claim 20 except the second the second storage volume is set as a replica volume of the first storage volume,

        and wherein the control unit stores data into the first storage volume and the second storage volume if the control unit receives a write command for writing data to the virtualized removable storage drive from the computer.

        Ofek discloses the second the second storage volume is set as a replica volume of the first storage volume (col. 8, lines 32-34 and 52-56; Fig. 1, elements 15, 196, 42, and 43);

        and wherein the control unit stores data into the first storage volume and the second storage volume if the control unit receives a write command for writing data to the virtualized removable storage drive from the computer (col. 11, lines 5-13).

        The combination of Allen/Blood and Ofek are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Ofek's mirror system within Allen/Blood's data storage system.

The motivation for doing so would have been to increase system reliability by providing a data processing system that includes redundant storage of data and that enables access to the data by multiple processes. (Ofek, col. 6, lines 3-5).

Therefore, it would have been obvious to combine Allen/Blood and Ofek for the benefit of obtaining the invention as specified in claim 20.

15.    **As per claim 22**, the combination of Allen/Blood/Ofek discloses the second storage volume is set as a replica volume of the first storage volume (Ofek, col. 8, lines 32-34 and 52-56; Fig. 1, elements 15, 196, 42, and 43);

wherein the control unit stores data into the first storage volume and the second storage volume if the control unit receives a write command for writing data to the virtualized removable storage drive from the computer (Ofek, col. 11, lines 5-13).

and wherein, based on receiving the second instruction from the computer, the control unit stops storing the data into the second storage volume (Ofek, col. 11, lines 24-30; col. 30, lines 35-37). *It should be noted that that instruction for "independent operating mode" is analogous also to the "second instruction" because in independent operating mode the local system is effectively "ejected" from the network leaving the remote system to operate independently.*

16.    **As per claim 27**, the combination of Allen/Blood/Ofek discloses a second storage volume of the plurality of storage volumes is set as a replica storage volume of

the first storage volume (Ofek, col. 8, lines 32-34 and 52-56; Fig. 1, elements 15, 196,

42, and 43);

wherein the computer sends a write command for storing data into the virtualized

removable storage drive to the data storage apparatus (Ofek, col. 11, lines 5-7); *It*

*should be noted it is inherently required a write command be sent in order for host*

*system 13 to update volumes 15 and 16.*

and in response to receiving the write command, the data storage apparatus

stores the data into the first storage volume and the second storage volume (Ofek, col.

11, lines 5-13).

17.     **As per claim 28**, the combination of Allen/Blood/Ofek discloses the computer

sends a third instruction to the data storage apparatus for stopping data replication

(Ofek, col. 11, lines 24-30); *See the citation note for claim 21 above.*

in response to receiving the third instruction, the data storage apparatus stops

storing the data into the second storage volume (Ofek, col. 11, lines 24-30; col. 30, lines

35-37). *See the citation note for claim 21 above.*

18.     **As per claim 29**, the combination of Allen/Blood/Ofek discloses a second

storage volume of the plurality of storage volumes is set as a replica storage volume of

the first storage volume (Ofek, col. 8, lines 32-34 and 52-56; Fig. 1, elements 15, 196,

42, and 43),

wherein the computer sends a write command for storing data into the virtualized

removable storage drive to the data storage apparatus (Ofek, col. 11, lines 5-7); *See*

*the citation note for claim 27 above.*

in response to receiving the write command, the data storage apparatus stores

the data into the first storage volume and the second storage volume (Ofek, col. 11,

lines 5-13),

and in response to receiving the first instruction, the data storage apparatus stops

storing the data into the second storage volume and notifies the computer of completion

of re-loading the first removable storage to the virtualized removable storage drive

(Ofek, col. 11, lines 5-7; Allen, col. 10, lines 1-9; col. 20, lines 9-26; Fig. 7).

**19.     Claims 18-19 and 30-31 are rejected under 35 U.S.C. 103(a) as being**

**obvious over Allen in view of Blood as applied to claim 14 above, and futher in**

**view of Sekido (U.S. Patent 6,311,193).**

20.     **As per claim 18**, the combination of Allen/Blood discloses all the limitations of

claim 18 except in response to receiving a verification command for confirming a type of

the virtualized removable storage drive in the data storage apparatus from the

computer, the control unit sends a reply indicating that the virtualized removable storage

drive handles the removable storage medium even though the data storage apparatus

has the plurality of non-removable storage devices.

Sekido discloses in response to receiving a verification command for confirming

a type of the virtualized removable storage drive in the data storage apparatus from the

computer, the control unit sends a reply indicating that the virtualized removable storage

drive handles the removable storage medium even though the data storage apparatus

has the plurality of non-removable storage devices (col. 12, lines 19-24). *It should be*

*noted that the "inquiry" is analogous to the "verification command." It should also be*

*noted that it is inherently required there be some sort of "drive" in order to interface with the disks. Lastly, it should be noted that the "disk snapshot section" of the data storage apparatus is a non-removable storage device.*

The combination of Allen/Blood and Sekido are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Sekido's virtual removable disk within Allen/Blood's data storage system.

The motivation for doing so would have been to eliminate the problem of upper limits on number of disks visible to programs, thus making it easier to manage the computer system (Sekido, col. 11, lines 56-62).

Therefore, it would have been obvious to combine Allen/Blood and Sekido for the benefit of obtaining the invention as specified in claim 18.

21.     **As per claim 19**, the combination of Allen/Blood/Sekido discloses in response to receiving a verification command for verifying a type of the virtualized removable storage drive of the data storage apparatus from the computer, the control unit sends a reply indicating that the virtualized removable storage drive is a magnetic disk drive unit which handles a removable storage medium even though the data storage apparatus has the plurality of non-removable storage devices (Sekido, col. 12, lines 14-24). *See the citation note for claim 18 above.*

22.     **As per claim 30**, the combination of Allen/Blood/Sekido discloses wherein the computer sends a verification command for verifying a type of the virtualized removable

storage drive in the data storage apparatus to the data storage apparatus (Sekido, lines 23-24),

and in response to receiving the verification command, the data storage apparatus sends a reply indicating that the virtualized removable storage drive handles a removable storage medium even though the data storage apparatus has the plurality of non-removable storage devices (Sekido, col. 12, lines 19-24). *See the citation note for claim 18 above.*

23.     **As per claim 31**, the combination of Allen/Blood/Sekido discloses wherein the computer sends a verification command for verifying a type of virtualized removable storage drive in the data storage apparatus to the data storage apparatus (Sekido, lines 23-24),

and in response to receiving the verification command, the data storage apparatus sends a reply indicating that virtualized removable storage drive is a magnetic disk drive which has a removable storage medium even though the data storage apparatus has hard disk drives which are included in the non-removable storage devices (Sekido, col. 12, lines 19-24). *See the citation note for claim 18 above.*

24.     **Claim 21 is rejected under 35 U.S.C. 103(a) as being obvious over Allen in view of Blood as applied to claim 14 above, further in view of Sekido as applied to claim 19 above, and even further in view of Ofek.**

25.     The combination of Allen/Blood/Sekido discloses all the limitations of claim 21 except in response to receiving a third instruction for stopping a replication from the computer, the control unit stops storing the data into the second storage volume.

Ofek discloses in response to receiving a third instruction for stopping a replication from the computer, the control unit stops storing the data into the second storage volume (col. 11, lines 24-30; col. 30, lines 35-37). *It should be noted that the instruction for "independent operating mode" is analogous to the "third instruction."*

The combination of Allen/Blood/Seikdo and Ofek are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Ofek's mirror system within Allen/Blood/Sekido's data storage system.

The motivation for doing so would have been to increase system reliability by providing a data processing system that includes redundant storage of data and that enables access to the data by multiple processes. (Ofek, col. 6, lines 3-5).

Therefore, it would have been obvious to combine Allen/Blood/Sekido and Ofek for the benefit of obtaining the invention as specified in claim 21.


### Response to Arguments

26.     Applicant's arguments with respect to **claims 14-32** have been considered but are moot in view of the new grounds of rejection above.

### *Conclusion*

## STATUS OF CLAIMS IN THE APPLICATION

The following is a summary of the treatment and status of all claims in the

application as recommended by MPEP 707.70(i):

### CLAIMS REJECTED IN THE APPLICATION

Per the instant office action, **claims 14-32** have received a first action on

the merits and are subject of a first action non-final.


Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Arpan P. Savla whose telephone number is (571) 272-

1077. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Sanjiv Shah can be reached on (571) 272-4098. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

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USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Arpan Savla
Art Unit 2185
June 15, 2007

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